

CHAPTER 1

GENERAL INFORMATION

Caltrans Structure and Functions 1-01

1-01.1 Headquarters Organization

The organization of the Department of Transportation and the relationship of the various Divisions are shown in Figures 1-1 and 1-2.

1-01.2 Division Structure and Responsibilities

The Division of Operations operates as a functional organization under the Deputy Director for Engineering and Operations. He, as Chief Engineer, is responsible for all activities and functions of the Division of Project Development, the Division of Right of Way, the Division of Construction, the Division of Maintenance, and the Division of Operations.

1-01.3 Chief, Division of Operations

The Chief, Division of Operations, is in direct charge of the Office of Traffic Engineering, the Office of Transportation Operations, the Office of High Occupancy Vehicle Programs, and the Office of Ridesharing (See Figure 1-3). He is responsible for:

1. Planning, organizing, directing and coordinating the activities of each office;
2. Ensuring that the assigned responsibilities of the Division are performed in accordance with statewide transportation goals, objectives, policies, regulations and standards;
3. Representing the Department by membership in state and national technical organizations;
4. Serving as a member of the Headquarters Staff Management Committee; and
5. Providing advice and assistance to the Chief Engineer and the District Directors in matters pertaining to the Division.

1-01.4 Chief, Office of Traffic Engineering

The Chief, Office of Traffic Engineering, is in charge of all traffic engineering and safety functions and is responsible for:

1. Activities to promote the safe, orderly and expeditious movement of traffic;
2. Standardization of traffic engineering practices throughout the districts;
3. Coordinating the activities of and furnishing advice and guidance to the eleven district traffic departments;
4. Overseeing compliance with the Federal-Aid Highway Program Manual in traffic operations and traffic safety improvements;

5. Participating in the work of state and national committees concerned with traffic engineering and uniformity of traffic control devices.

FUNCTIONS

The major functions of the Office of Traffic Engineering are assigned to three units, the Electrical Systems and Roadway Records Branch, the Traffic Safety Program and Research Branch, and the Signs and Delineation Branch (See Figure 1-3).

1. *Electrical Systems and Roadway Records Branch*

- *Electrical Systems Standards*
 - a. Develop standard signal and lighting plans and standard specifications for general use.
 - b. Establish methods to determine the need for highway signal and lighting projects.
 - c. Study reports and recommendations submitted by the Districts as to the need for and adequacy of proposed signal and lighting projects.
 - d. Make field inspections of installations and advise the Districts in the planning, design and operation of electrical traffic control and safety devices.
 - e. Conduct studies and research into improved signal and lighting devices to enhance the safe movement of traffic.
 - f. Provide consultation and training in electrical systems hardware and software techniques for microprocessor control of signals for district personnel.
- *Roadway Records*
 - a. Direct and coordinate the statewide traffic volumes program to assure development, maintenance and continuity of traffic volume records on the State Highway System.
 - b. Produce monthly and annual traffic volume and travel trend data.
 - c. Research traffic volume relationships.
 - d. Operate and maintain the automated Traffic Accident Surveillance and Analysis System (TASAS) for determining locations of high accident concentration throughout the state.
 - e. Prepare annual tabulations of accident and traffic data.
 - f. Direct and coordinate the statewide 55 mph speed monitoring program, the statewide vehicle classification studies and the truck weight and size studies, all in cooperation with the FHWA.

2. *Traffic Safety Program and Research Branch*

- Traffic Safety Program
 - a. Identify traffic safety needs on a statewide basis and establish goals, objectives, and criteria for the selection and prioritization of traffic safety projects.
 - b. Monitor and coordinate with the FHWA the implementation of the HB1 special Safety Improvements program.
 - c. Establish procedures for evaluation of the effectiveness of the special Safety Improvements program.
- Traffic Safety Research
 - a. Administer traffic research programs, including research accomplished by the Districts and other Headquarters units and state agencies.
 - b. Conduct traffic safety oriented research and publish results.
 - c. Establish warrants and standards for traffic safety devices, systems and procedures.
 - d. Prepare designs, standard plans and installation instructions for guardrail, median barriers, crash cushions and other traffic safety devices.
 - e. Act as technical consultants to the Districts in the design and construction of traffic safety devices.
- Traffic Engineering Services

Administer a program for providing traffic engineering services to cities under 25,000 population.

3. *Signs and Delineation Branch*

- Standards

Develop standards for signing, delineation, warning devices and pavement markings, and advise the Districts regarding their use.
- Regulation

Review ordinances and resolutions pertaining to the regulation of traffic by local authorities which require the approval of Caltrans.

1-01.5 **Chief, Office Of Transportation Operations**

The Chief, Office of Transportation Operations is in charge of all transportation operational functions.

1. Operational Research

- a. Conduct research and evaluate traffic operational improvements along existing highways.
- b. Coordinate traffic operational research and evaluations accomplished by other agencies, consultants, universities, districts and other Headquarters divisions.
- c. Make highway capacity studies and conduct research in highway traffic flow.
- d. Prepare reports for design and operation of the State Highway Program.

2. Operational Programs

- a. Serve as Program Advisors in the budgeting and expenditure of funds under the HK2 (Traffic Operations) and the HB4 (System Operation Improvements) Programs.
- b. Review project reports for operational improvements from a traffic service standpoint.

3. Traffic Operations and Liaison

- a. Review preliminary geometric design features of proposed projects at the request of the Office of Planning and Design.
- b. Assist the Headquarters Design Coordinators in correlating geometric design and directional signing.

1-01.6 **Chief, Office Of High Occupancy Vehicle Programs**

The Chief, Office of High Occupancy Vehicle Programs, provides statewide liaison on high occupancy vehicle projects and provides Program Advisors in the budgeting and expenditure of funds under the HB4 (System Operation Improvements) Program.

High occupancy vehicle (HOV) projects are included in the HB4 Program, but the Office has been established separately from the Office of Transportation Operations to carry out those components of the HB4 Program dealing with high occupancy vehicles.

Typical HOV projects are:

- Providing exclusive or preferential lanes on roadways for high occupancy vehicles.
- Providing ramp meter bypasses for high occupancy vehicles.
- Providing a limited number of parking facilities presently authorized in existing legislation using State Highway Account Funds.
- Improving bus service.

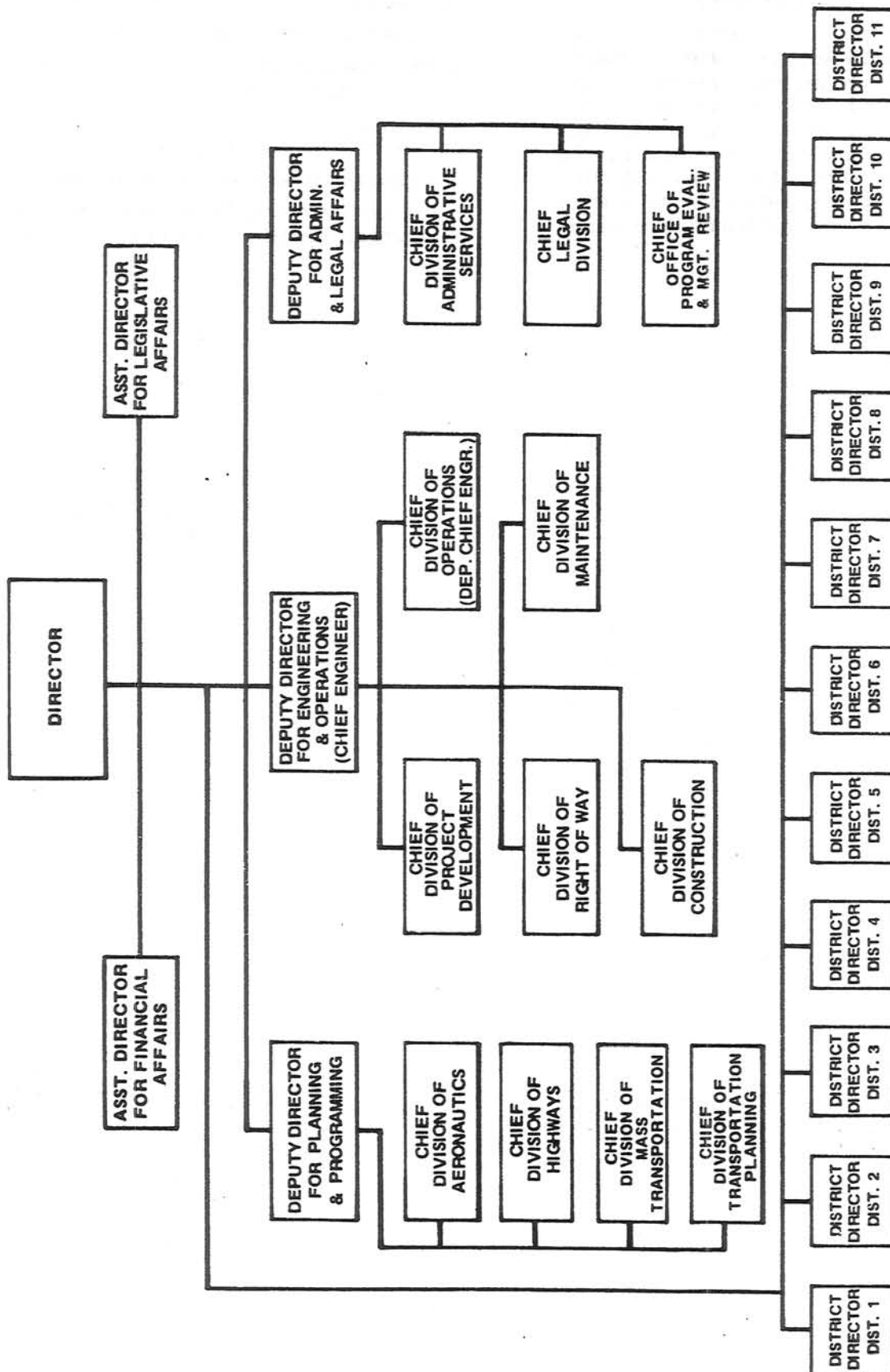
1-01.7 Chief, Office Of Ridesharing

The Chief, Office of Ridesharing, serves as administrator of the Department's Statewide Ridesharing Program. He recommends program goals, policies and objectives and coordinates implementation through the Caltrans-sponsored network of regional ridesharing offices. As head of the ridesharing function, he coordinates Federal, State and local activities to encourage ridesharing and represents the Department nationally regarding ridesharing strategies.

The Ridesharing Program (HK1) includes:

- Area-wide dial-in matching services.
- Organizational and mail-in services to promote car, van and bus pooling.
- Outreach programs to encourage major employers to establish in-house ridesharing.
- Consulting services on carpool incentives.
- Liaison between public and private sector organizations interested in promoting ridesharing.

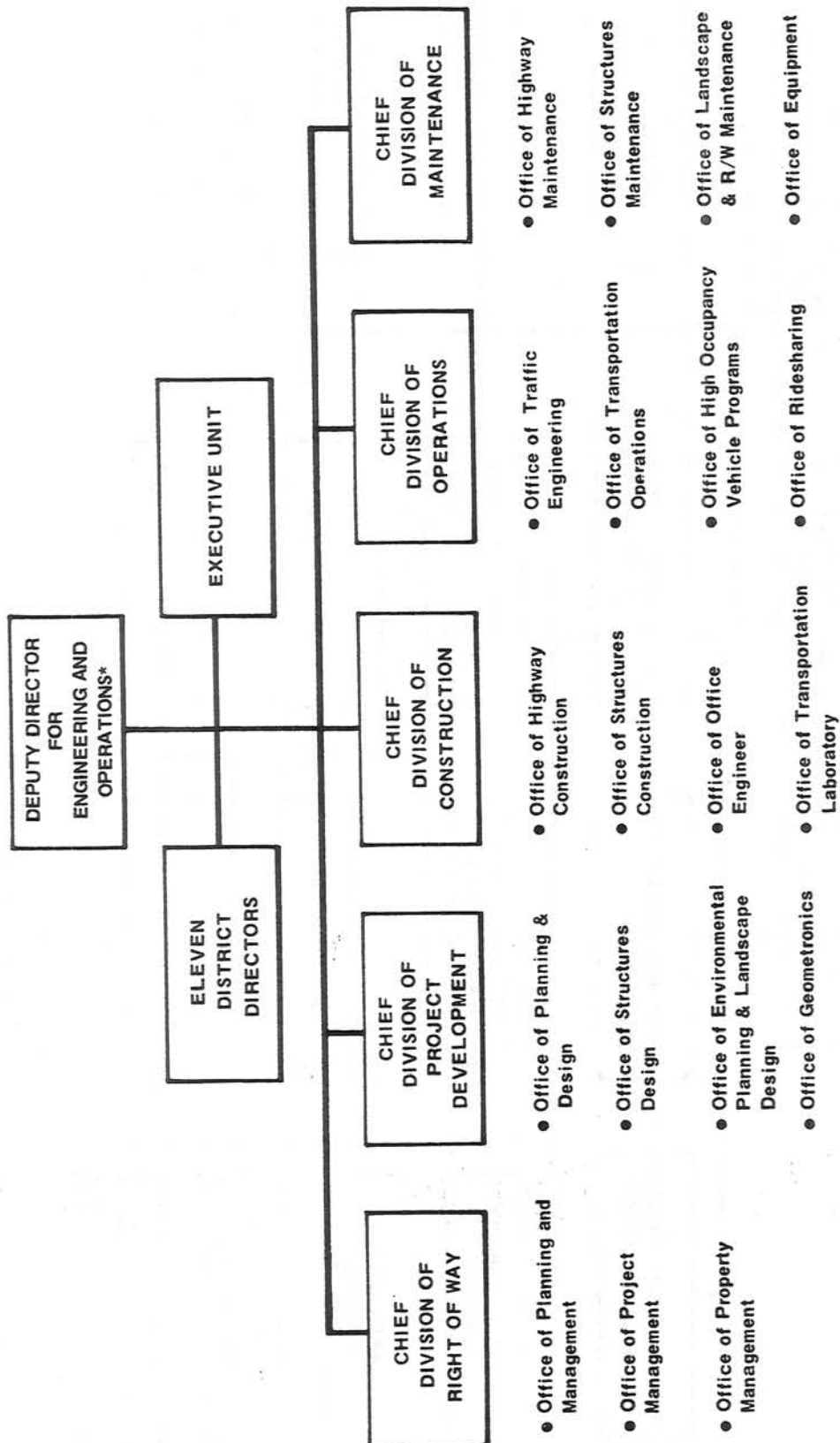
Figure 1-1



CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MAY, 1978

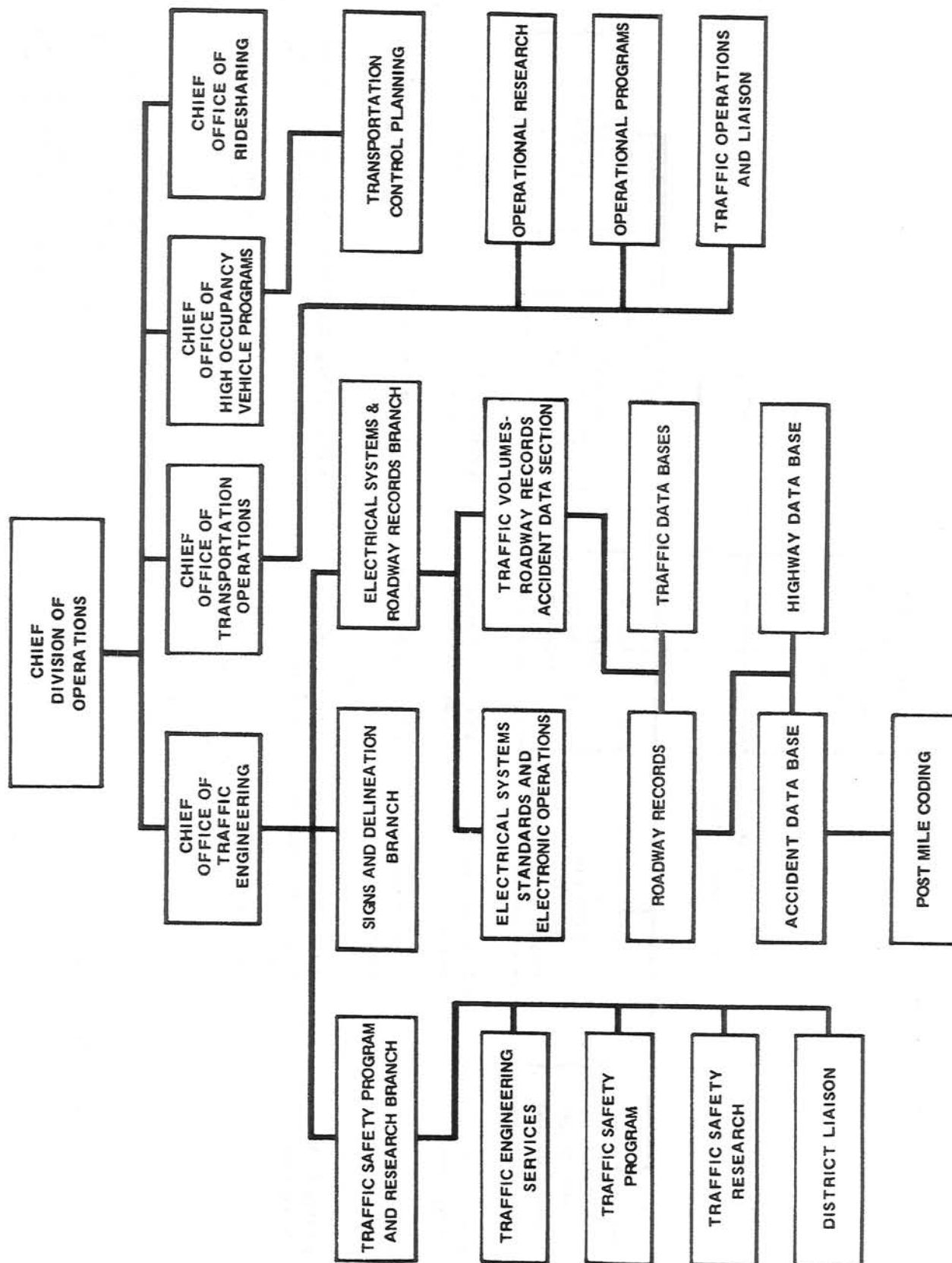
Figure 1-2



*ALSO CHIEF ENGINEER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DEPUTY DIRECTOR
ENGINEERING AND OPERATIONS

Figure 1-3



Designation of Highway Routes 1-02**1-02.1 Legislative Route Numbers and Descriptions**

The Legislature designates all State highway routes and assigns route numbers. The description and number of each route are contained in Chapter 2, Article 3 of the Streets and Highways Code. These route numbers are used for all administrative purposes.

It is the Legislative intent that, to the extent possible, the number used on each route's guide signs be the same as the designated route number. The route description has a specific status direction generally south to north and west to east. The status direction and Legislative number are reproduced in the State Highway Log, which is distributed annually by the Office of Traffic Engineering.

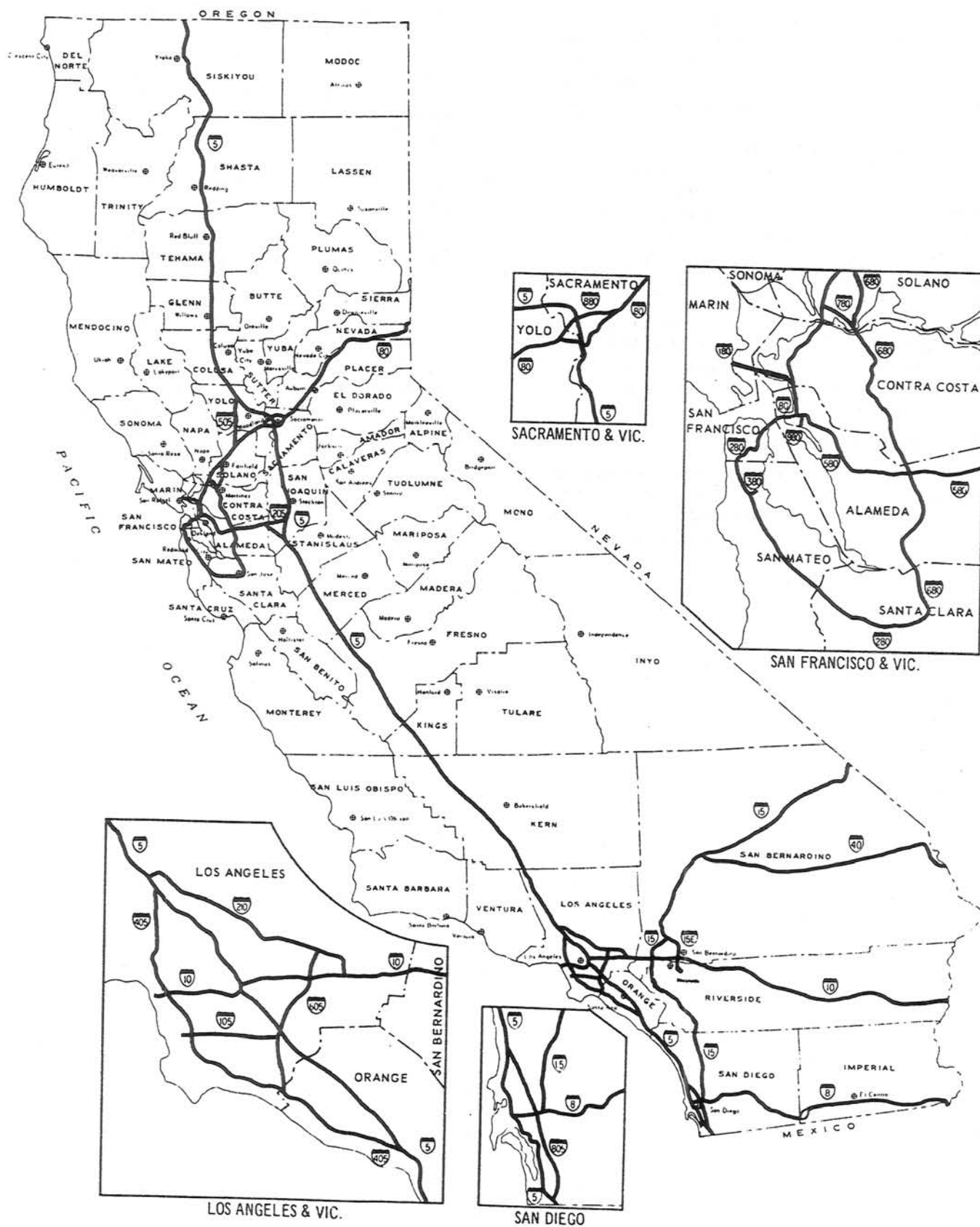
A specific location on any State highway is described by its Post Mile designation. Post Mile information is available in the State Highway Log and also is shown on Post Mile Maps distributed by the Office of Office Engineer.

1-02.2 Sign Route Numbers

There are three signed route systems on California State highways. Each system is signed with distinctive route markers to facilitate public travel. (Numbers are not duplicated on another system.)

1. Interstate System. A network of planned free-ways of national importance which are also State highways (See Figure 1-4). The numbering of the Interstate routes was developed by AASHTO and with the concurrence of the states. Renumbering of these routes requires the approval of AASHTO to assure conformity with established numbering procedures. Such revisions also are a system action that must be approved by the Federal Highway Administrator.
2. United States Numbered Routes. A network of highways of national importance. These are State highways, but are not necessarily free-ways. The establishment of a U. S. number as a guide for interstate travel over certain roads has no connection with Federal control, any Federal-Aid System, or Federal construction financing. The Executive Committee of AASHTO, with the concurrence of the states, has full authority for numbering U. S. routes.
3. State Sign Routes. State-maintained highways within the State, other than the above signed routes, which are distinctively signed to serve intra-state and interstate travel desires.

Figure 1-4



Federal-Aid Highways 1-03**1-03.1 Federal-Aid Systems****GENERAL**

The "Federal Highway Acts" section of the "Statutes relating to the California Department of Transportation," issued by the Legal Division, is an excellent reference on Federal-Aid Systems.

Highways, roads and streets that are included in the Federal-Aid Systems are eligible for Federal funding on a matching basis as prescribed by Federal law.

INTERSTATE SYSTEM

The Interstate System is a National System of Interstate and Defense Highways consisting of a planned network of freeways which connects principal metropolitan areas, cities, and industrial centers, serves the national defense, and connects at suitable border points with routes of continental importance.

This System was selected by joint action of the states, in cooperation with the FHWA, and approved by the Secretary of Transportation. It comprises the 42,500-mile nationwide total authorized by Federal law.

California's portion totals 2,300 miles of State highways and is included as part of the Federal-aid primary mileage.

Other Federal-aid primary mileage is also eligible for addition to the Interstate System for signing purposes only. This mileage must meet the criteria for Interstate routes and be developed to Interstate standards prior to signing. This additional mileage is not eligible for Interstate funding.

The "backbone" Interstate System was established in 1947. Urban loops, spurs, belt line routes, and extensions have been added.

FEDERAL-AID PRIMARY SYSTEM

The Federal-Aid Primary System consists of routes of the Interstate System and a connected system of other principal highways with their urban extensions into or through the urban areas. The Primary System originated with the Federal-Aid Highway Act of 1921.

As of June 30, 1976, the Federal-Aid Primary System consists of connected main roads which are important to interstate, statewide, and regional travel, consisting of rural arterial routes and their extensions into or through urban areas.

The Primary System in California now totals 13,421 miles; 2,300 miles are Interstate routes, 10,863 are other State highways, and 258 miles are nonstate highways. The nonstate highways consist of 173 miles of FAP National Park roads in Lassen, Yosemite, Kings Canyon and Sequoia National Parks and 85

miles of county roads. Approximately 2,200 miles of the Primary System are in urban areas.

Primary routes are selected by Caltrans in a comprehensive transportation planning process, subject to approval by the U. S. Secretary of Transportation.

FEDERAL-AID SECONDARY SYSTEM

This System was first established by the Federal-Aid Highway Act of 1921. It is composed of state highways and local roads. The Federal-aid systems realignment by the Federal-Aid Highway Act of 1973 provided, on June 30, 1976, that the Federal-Aid Secondary System shall consist of rural major collector routes. The Secondary System is applicable to rural areas only. Routes cannot overlap any other Federal-aid system and cannot be located within an urban area.

Secondary routes in California total approximately 10,975 miles. There are 945 miles of State Highway routes, and the remainder are county roads and city streets not within urban areas. The Secondary System routes are selected cooperatively by Caltrans and the appropriate local officials, subject to approval by the U. S. Secretary of Transportation.

FEDERAL-AID URBAN SYSTEM

The Federal-Aid Urban System was established by the Federal-Aid Highway Act of 1970. The System serves major centers of activity in each urbanized area.

Realignment of Federal-Aid Systems was provided by the Federal-Aid Highway Act of 1973. Since June 30, 1976, the Federal-Aid Urban System is located in each urbanized area and other designated urban areas. The routes on the Urban System consist of urban arterial and collector routes; they are designated by appropriate local officials with the concurrence of Caltrans, subject to approval by the U. S. Secretary of Transportation.

There are approximately 16,050 miles on the California Urban System. No route on the Urban System may overlap any other Federal-aid system. Some 1,100 miles of the Urban System are State highways.

FOREST HIGHWAYS

Forest Highways were instituted by the Federal-Aid Highway Act of 1921. They are not part of the Federal-aid systems. To qualify for Forest Highway designation, a route must also be on the Federal-aid system. Forest Highways are roads of primary importance to the State, counties, or communities that are within, adjoining, or adjacent to national forests. At present there are 2,224 miles of Forest Highways in California; 1,840 miles are State Highways and 384 miles are county roads.

NATIONAL ROADS

The Federal government has jurisdiction of more than 37,100 miles of National Roads in California. These include forest development roads and trails, park roads and trails, parkways, Indian reservation roads, public lands highways, and defense access roads.

Federal funds are specifically appropriated for expenditure on these roads.

1-03.2 Apportionment Formulae

INTERSTATE SYSTEM

Federal-aid apportioned to the states from the Highway Trust Fund for expenditures on the Interstate System is determined by the ratio which the Federal share of the estimated cost of completing the Interstate System in each state bears to the estimated total cost of the Federal share of completing the system in all the states. The Federal share payable on the Interstate System is approximately 91.5% in California.

CONSOLIDATED PRIMARY

Funds apportioned for expenditure on the Federal-aid primary system are designated as Consolidated Primary Funds. Apportionment of Consolidated Primary funds among the states is determined as follows:

1. Two-thirds according to the following formula:
 - a. One-third in the ratio which the area of each state bears to the total area of all the states.
 - b. One-third in the ratio which the population of rural areas of each state bears to the total population of rural areas of all the states.
 - c. One-third in the ratio which the mileage of rural delivery routes and intercity mail routes, where service is performed by motor vehicles, in each state bears to the total mileage of such routes in all the states.
2. And one-third in the ratio which the population in urban areas in each state bears to the total population in urban areas in all the states.

SECONDARY SYSTEM

Apportionment of Secondary funds among the states is determined as follows:

1. One-third in the ratio which the area of each state bears to the total area of all the states.
2. One-third in the ratio which the population of rural areas of each state bears to the total population of rural areas of all the states.
3. One-third in the ratio which the mileage of rural delivery routes and intercity mail routes, where service is performed by motor vehicles, in each state bears to the total mileage of such routes in all the states.

URBAN SYSTEM

Federal-aid apportioned to the states from the Highway Trust Fund for expenditures on the Urban System is determined by the ratio which the population in urban areas in each state bears to the total population in such urban areas in all the states.

Funds are no longer apportioned for Urban Extensions of Primary and Secondary systems.

FEDERAL SHARE

The Federal share payable is approximately 83% on Consolidated Primary, secondary, or urban system projects. The Federal designations are F, RS, and M, respectively.

FOREST HIGHWAYS

Funds for the development of Forest Highways are appropriated by Congress each fiscal year from the General Fund. The apportionment of Forest Highway funds to each state is made as follows; one-half in the ratio that the area of national forest land in each state bears to the total area of such land in all the states; one-half in the ratio that the value of national forest land in each state bears to the total value of such land in all the states.

1-03.3 Federal-Aid Highway Act of 1976

The 1976 Highway Act authorized funds for completion of the Interstate System for fiscal years 1978 through 1990. It also provided for funding in the transition quarter ending September 30, 1976. Funds were authorized, for the first time, for expenditure on resurfacing, restoration and rehabilitation (RRR) on Interstate routes in use for at least five years. Programs for traffic safety improvements are described in Title II of the Act, known as the Highway Safety Act of 1976. The Act extended or authorized the various programs listed on Figure 1-5.

FEDERAL-AID PROGRAMS & REIMBURSEMENT %

Figure 1-5

<i>DESIGNATION</i>	<i>PROGRAM DESCRIPTION OF PROGRAM</i>	<i>TITLE 23 U.S.C. SECTION</i>	<i>FEDERAL REIMBURSE- MENT %</i>
I	Interstate	103(c)	91.49
IR	Interstate (R-R-R)	106	91.49
RF	Rural Primary	103(b)	83.00
F	Consolidated Primary	105	83.00
U	Urban Extension	104(b) (3)	83.00
FF	Priority Primary	147	83.00
M	Urban System (over 200,000)	103(d),150	83.00
M	Urban System	103(d),150	83.00
FFD	Discretionary Priority Primary		83.00
RS	Rural Secondary (FAS)	103(c)	83.00
HHS	High Hazard Safety	152	90.00
ROS	Eliminate Roadside Obstacles	153	90.00
HHS	Consolidated High Hazard and		
ROS	Eliminate Roadside Obstacles	152,153	90.00
BR	Bridge Replacement	144	75.00
FH	Forest Highways	204	100.00
DP	Economic Growth Center	143	83.00
FLH	Public Lands Highway	209	100.00
LSF(Primary)			
LSH(Urban)			
LSS(Secondary)	Landscaping and Scenic Enhancement	319	100.00
RRS	RR/Highway Crossing (on system)	130,203	90.00
RRP	RR Grade Crossing Protection	130,203	90.00
PMS	Pavement Marking	151	100.00
SRS	Safer Roads Demonstration	405,230	90.00
OS	Off-System Demonstration	219	83.00
SOS	Safer Off-System	219	83.00
TQF	Transition Quarter		83.00
BW	Bikeway Project		
CAF	Outdoor Advertising and Junkyard	131	
ER	Emergency Relief		To 100.00
ERFO	Emergency Relief Federally Owned		To 100.00

1-03.4 Highway Safety Act of 1976

The 1976 Highway Safety Act authorized Federal funds for safety-related highway improvements for fiscal years 1977 and 1978. The highway safety programs of major concern to the Office of Traffic Engineering include:

1. High Hazard Safety (HHS)

For projects at spot locations where accident history indicates a pattern susceptible to correction by safety improvements such as curve corrections, wet pavement corrections or traffic signals;

2. Eliminate Roadside Obstacles (ROS)

For blanket or systemwide improvements involving highway elements which are associated with accident frequency or severity, such as crash cushions, fixed object removal, upgrading guardrail or breakaway signs;

3. Railroad Grade Crossing Protection (RRP)

For the elimination of hazards at railway-highway crossings, on any Federal-aid system other than Interstate; also provides for off-system crossings (not on Federal-aid systems);

4. Railroad/Highway Crossing, On-System (RRS)

For construction of grade separation, bus turn-outs and road closures or relocations;

5. Pavement Marking (PMS)

For improvement of pavement markings on and off the Federal-aid System;

The Safer Roads Demonstration (SRS) program, a demonstration program for the construction of safety improvements off the Federal-aid highway system, is no longer a part of Title II safety funding in the 1976 Safety Act.

Funding of HHS and ROS projects was consolidated in the 1976 Act.

Nomenclature 1-04

1-04.1 Abbreviations

AASHTO—American Association of State Highway and Transportation Officials

DOT—U. S. Department of Transportation

FHWA—Federal Highway Administration

Caltrans or

Department—California Department of Transportation

CTC—California Transportation Commission

OP&D—Office of Planning and Design

District—Caltrans Districts

District Director—District Director of Transportation, Caltrans Districts

FAA—Federal Aviation Agency

PUC—Public Utilities Commission

1-04.2 Definitions

GEOMETRIC CROSS SECTION

AUXILIARY LANE. The portion of the roadway adjoining the traveled way for weaving, truck climbing, speed change, or for other purposes supplementary to through traffic movement.

LANE NUMBERING. On a multilane roadway, the traffic lanes available for through traffic traveling in the same direction are numbered from left to right when facing in the direction of traffic flow.

MEDIAN LANE. A speed change lane within the median to accommodate left turning vehicles.

SEPARATE TURNING LANE. An auxiliary lane for traffic in one direction which has been physically separated from the intersection area by a traffic island.

SPEED CHANGE LANE. An auxiliary lane, including tapered areas, primarily for the acceleration or deceleration of vehicles entering or leaving the through traffic lanes.

TRAFFIC LANE. The portion of the traveled way for the movement of a single line of vehicles.

MEDIAN. The portion of a divided highway separating the traveled ways for traffic in opposite directions.

OUTER SEPARATION. The portion of an arterial highway between the traveled ways of a roadway for through traffic and a frontage street or road.

ROADBED. That portion of the roadway extending from curb line to curb line or shoulder line to shoulder line. Divided highways are considered to have two roadbeds.

ROADSIDE. A general term denoting the area adjoining the outer edge of the roadbed. Extensive areas between the roadbeds of a divided highway may also be considered roadside.

ROADWAY. That portion of the highway included between the outside lines of the sidewalks, or curbs and gutters, or side ditches including also the appertaining structures, and all slopes, ditches, channels, waterways, and other features necessary for proper drainage and protection.

SHOULDER. The portion of the roadway contiguous with the traveled way for accommodations of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

TRAVELED WAY. The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

HIGHWAY STRUCTURES

ILLUSTRATION OF TYPES OF STRUCTURES.

Figure 1-6 illustrates the names given to common types of structures used in highway construction. This nomenclature shall be used in all phases of planning.

BRIDGES. Structures of a span of more than 20 feet, measured under the copings along the centerline of the road and multiple span structures where the individual spans are in excess of 10 feet, measured from center to center of supports along the centerline of the road.

CULVERT. A closed conduit, other than a bridge, which conveys water carried by a natural channel or waterway transversely under the roadway.

HIGHWAY TYPES

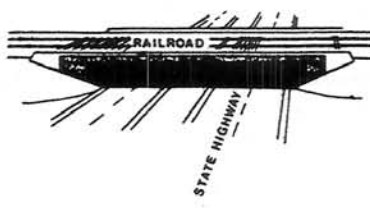
FREEWAY. A freeway, as defined by statute, is a highway in respect to which the owners of abutting lands have no right or easement of access to or from their abutting lands or in respect to which such owners have only limited or restricted right or easement of access. This statutory definition also includes expressways.

The engineering definitions for use in this manual are:

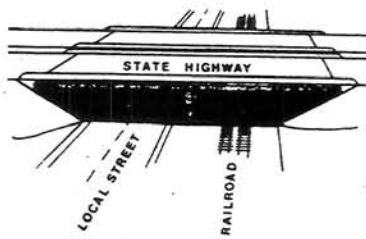
FREEWAY. A divided arterial highway with full control of access and with grade separations at intersections.

EXPRESSWAY. An arterial highway with at least partial control of access, which may or may not be divided or have grade separations at intersections.

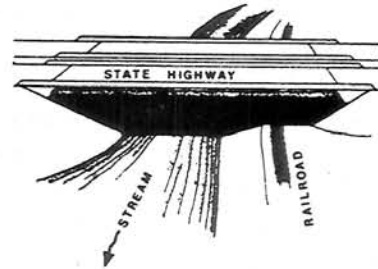
Figure 1-6
TYPES OF STRUCTURES



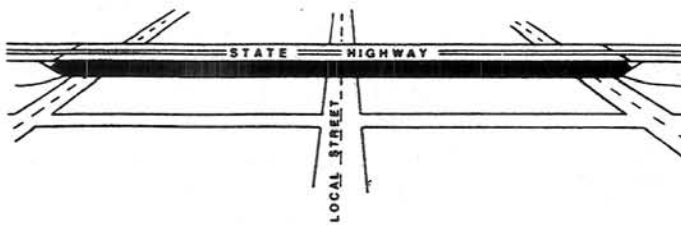
UNDERPASS



OVERHEAD



BRIDGE & OVERHEAD



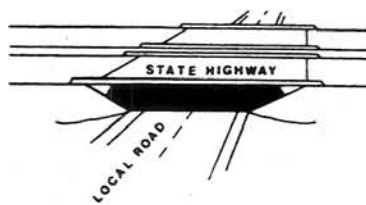
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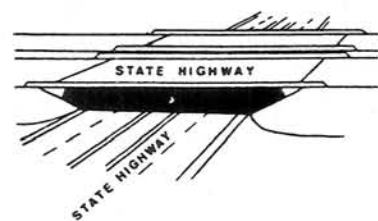
BRIDGE



OVERCROSSING



UNDERCROSSING



SEPARATION

CONTROLLED ACCESS HIGHWAY. In situations where it has been determined advisable by the Chief Engineer or the CTC, a facility may be designated a "controlled access highway" in lieu of the designation "freeway". All statutory provisions pertaining to freeways and expressways shall apply to controlled access highways.

CONVENTIONAL HIGHWAY. A highway with no control of access which may or may not be divided or have grade separations at intersections.

HIGHWAY

ARTERIAL HIGHWAY. A general term denoting a highway primarily for through traffic usually on a continuous route.

BELT HIGHWAY. An arterial highway for carrying traffic partially or entirely around an urban area or portion thereof. (Also called a circumferential highway.)

BYPASS. An arterial highway that permits traffic to avoid part or all of an urban area.

DIVIDED HIGHWAY. A highway with separated roadbeds for traffic in opposing directions.

MAJOR STREET OR MAJOR HIGHWAY. An arterial highway with intersections at grade and direct access to abutting property and on which geometric design and traffic control measures are used to expedite the safe movement of through traffic.

RADIAL HIGHWAY. An arterial highway leading to or from an urban center.

THROUGH STREET OR THROUGH HIGHWAY. Every highway or portion thereof on which vehicular traffic is given preferential right of way and at the entrance to which vehicular traffic from intersecting highways is required by law to stop before entering or crossing the same when stop signs are erected.

PARKWAY. An arterial highway for noncommercial traffic, with full or partial control of access, usually located within a park or a ribbon of park-like development.

SCENIC HIGHWAY. An officially designated portion of the State Highway System traversing areas of outstanding scenic beauty which together with the adjacent scenic corridors requires special scenic conservation treatment.

STREET OR ROAD

CUL-DE-SAC STREET. A local street open at one end only with special provisions for turning around.

DEAD END STREET. A local street open at one end only without special provisions for turning around.

FRONTAGE STREET OR ROAD. A local street or road auxiliary to and located on the side of an arterial highway for service to abutting property and adjacent areas and for control of access.

LOCAL STREET OR LOCAL ROAD. A street or road primarily for access to residence, business, or other abutting property.

TOLL ROAD, BRIDGE OR TUNNEL. A highway, bridge, or tunnel open to traffic only upon payment of a direct toll or fee.

INTERSECTIONS

CHANNELIZATION. The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

BARRIER CURB. A curb that is designed to prevent or discourage vehicles from leaving the pavement.

GEOMETRIC DESIGN. Geometric design is the arrangement of the visible elements of a road, such as alignment, grades, sight distances, widths, slopes, etc.

CORE. The area immediately beyond the divergence of two roadways bounded by the edges of those roadways.

GRADE SEPARATION. A crossing of two highways or a highway and a railroad at different levels.

INTERCHANGE. A system of interconnecting roadways in conjunction with a grade separation or grade separations providing for the interchange of traffic between two or more roadways on different levels.

INTERCHANGE ELEMENTS

BRANCH CONNECTION. A multilane connection between two freeways.

FREEWAY TO FREEWAY CONNECTION. A single or multilane connection between freeways.

RAMP. A connecting roadway between a freeway or expressway and another highway, road, or roadside area.

INTERSECTION. The general area where two or more roadways join or cross, with which are included in the roadway and roadside facilities for traffic movements in that area.

ISLAND. A defined area between traffic lanes for control of vehicle movements or for pedestrian refuge. Within an intersection a median or an outer separation is considered an island.

MINIMUM TURNING RADIUS. The radius of the path of the outer front wheel of a vehicle making its sharpest turn.

SKEW ANGLE. The complement of the acute angle between two centerlines which cross.

WEAVING SECTION. A length of one way roadway, designed to accommodate weaving, at one end of which two one way roadways merge and at the other end of which they separate.

HIGHWAY LANDSCAPE ARCHITECTURE

LANDSCAPE ARCHITECTURE. The design profession concerned with the shaping of the human habitat by arranging the natural and man made features of the landscape for human use and enjoyment.

HIGHWAY LANDSCAPE ARCHITECTURE. The practice of landscape architecture as applied to the highway placement and environment.

SCENIC CORRIDOR. A band of land which is visible from and generally adjacent to, but outside of, the highway right of way having scenic, historical, or other aesthetic characteristics.

LANDSCAPED FREEWAY. A section or sections of a freeway which is now, or hereafter may be, improved by the planting, at least on one side of the freeway right of way, of lawns, trees, shrubs, flowers, or other ornamental vegetation which shall require reasonable maintenance. Planting for the purpose of soil erosion control, traffic safety requirements, or reduction of fire hazards does not change the character of a freeway to a landscaped freeway.

HIGHWAY PLANTING. The installation of plant materials and irrigation systems on the highway right of way for aesthetic and functional purposes.

REPLACEMENT PLANTING. The installation of plantings and/or irrigation systems for the purpose of replacing existing highway plantings and/or irrigation systems removed during a highway widening, reconstruction project, or other operational improvement work; or the planting of native vegetation of special quality, particularly through U. S. Forest Service lands, State forests, and all park lands in areas where existing native vegetation was removed during highway construction or other operational improvement.

SAFETY ROADSIDE REST. A roadside area provided for motorists to stop and rest for short periods. It includes parking facilities separated from the roadway, drinking water, toilets, and may include tables, benches, telephones, information panels and other facilities for motorists.

VISTA POINT. A roadside area provided for motorists to stop their vehicles beyond the shoulder primarily for viewing the scenery in safety.

RIGHT OF WAY

ABANDONMENT. The reversion of title to the owner of the underlying fee where an easement for highway purposes is no longer needed.

ACQUISITION. The process of obtaining right of way.

AIR RIGHTS. The property rights for the control or specific use of a designated airspace involving a highway.

APPRAISAL. An expert opinion of the market value of property including damages, if any, as of a specified date, resulting from an analysis of facts.

CONDEMNATION. The process by which property is acquired for public purposes through legal proceedings under power of eminent domain.

CONTROL OF ACCESS. The condition where the right of owners or occupants of abutting land or other persons to access in connection with a highway is fully or partially controlled by public authority.

EASEMENT. A right to use or control the property of another for designated purposes.

EMINENT DOMAIN. The power to take private property for public use without the owners consent upon payment of just compensation.

ENCROACHMENT. Occupancy of highway right of way by nonhighway structures or objects of any kind or character.

INVERSE CONDEMNATION. The legal process which may be initiated by a property owner to compel the payment of just compensation where his property has been taken or damaged for a public purpose.

NEGOTIATION. The process by which property is sought to be acquired for highway purposes through mutual agreement upon the terms for transfer of such property.

PARTIAL TAKING. The acquisition of a portion of a parcel of property.

RELINQUISHMENT. A transfer of the State's right, title, and interest in and to a highway, or portion thereof, to a city or county.

RIGHT OF ACCESS. The right of an abutting land owner for entrance to or exit from a public road.

SEVERANCE DAMAGES. Loss in value of the remainder of a parcel resulting from a partial taking of real property.

STRUCTURAL DESIGN OF THE ROADBED

BASE. A layer of selected, processed, or treated aggregate material of planned thickness and quality placed immediately below the pavement and above the subbase or basement soil.

BASEMENT SOIL. The material in excavation, embankments, and embankment foundations immediately below the lowest layer of the structural section and extending to the depth that affects structural design.

BORROW. Natural soil obtained from sources outside the roadway prism to make up a deficiency in excavation quantities.

EMBANKMENT. A raised structure constructed of natural soil from excavation or borrow sources.

FLEXIBLE PAVEMENT. A pavement having sufficiently low bending resistance to maintain intimate contact with the underlying structure, yet having the required stability furnished by aggregate interlock, internal friction, and cohesion to support traffic.

BASE COURSE. The bottom portion of a pavement where the top and bottom portions are not of the same composition.

SURFACE COURSE. The top portion of a pavement where the top and bottom portions are not of the same composition.

PRIME COAT. The initial application of a low viscosity liquid bituminous material to an absorbent surface, preparatory to any subsequent treatment, for the purpose of hardening or toughening the surface and promoting adhesion between it and the superimposed constructed layer.

RESURFACING. A supplemental surface or replacement placed on an existing pavement to restore its riding qualities or increase its strength.

RIGID PAVEMENT. A pavement having sufficiently high bending resistance to distribute loads over a comparatively large area.

SEAL COAT. A bituminous coating with or without aggregate applied to the surface of a pavement for the purpose of waterproofing, preserving, or rejuvenating a bituminous surface, or to provide increased skid resistance or resistance to abrasion by traffic.

STRUCTURAL SECTION. The planned layers of specified materials, normally consisting of subbase, base, and pavement placed over the basement soil.

SUBBASE. A layer of aggregate of planned thickness and quality placed on the basement soils as the foundation for a base.

SUBGRADE. The portion of a roadbed surface, which has been prepared as specified, upon which a subbase, base, base course, or pavement is to be placed.

TACK COAT. The initial application of bituminous material to an existing surface to provide bond between the superimposed construction and the existing surface.

TRAFFIC

ANNUAL AVERAGE DAILY TRAFFIC. The average 24-hour volume, being the total number during a stated period divided by the number of days in that period. Unless otherwise stated, the period is a year. The term is commonly abbreviated as Annual ADT or AADT.

DELAY. The time lost while traffic is impeded by some element over which the driver has no control.

DENSITY. The number of vehicles per mile (or per lane per mile) on the traveled way at a given instant.

DESIGN SPEED. A speed selected to establish specific minimum geometric design elements for a particular section of highway.

DESIGN VEHICLE. A vehicle which has been adopted whose physical characteristics determine minimum geometric design requirements.

The vehicle which has been adopted as the commercial design vehicle is the 3-S-2 tractor semi-trailer combination, which consists of a 3-axle power unit and a 2-axle semitrailer.

DESIGN VOLUME. A volume determined for use in design, representing traffic expected to use the highway. Unless otherwise stated, it is an hourly volume.

DIVERGING. The dividing of a single stream of traffic into separate streams.

HEADWAY. The time in seconds between consecutive vehicles moving past a point in a given lane, measured front to front.

LEVEL OF SERVICE. A general term that describes the operating conditions a driver will experience while traveling on a particular facility.

MERGING. The converging of separate streams of traffic into a single stream.

RUNNING SPEED. The speed over a specified section of highway, being the distance divided by running time. The average for all traffic, or component thereof, is the summation of distances divided by the summation of running times.

RUNNING TIME. The time the vehicle is in motion.

SPACING. The distance between consecutive vehicles in a given lane, measured front to front.

SAFETY INDEX. The traffic Safety Index is a tool for evaluating safety benefits which provides a measure of the accident dollars saved by the motorist expressed as a percentage of the sum of R/W and construction costs.

TRAFFIC MARKINGS. All lines, words, or symbols, except signs, officially placed within the roadway to regulate, warn, or guide traffic.

TRAFFIC SIGN. A device mounted on a fixed or portable support, conveying a message or symbol to regulate, warn, or guide traffic.

TRAFFIC SIGNAL. A power operated traffic control device except signs, barricade warning lights, and steady burning electric lamps, by which traffic is regulated, warned, or alternately directed to take specific actions.

VOLUME. The number of vehicles passing a given point during a specified period of time.

WARRANTS. Warrants provide guidance to the engineer in evaluating the potential safety and operational benefits of traffic control devices and are based upon "average" or "normal" conditions. Warrants are not a substitute for engineering judgment. The fact that a "warrant" for a particular traffic control or safety device is met is not conclusive justification for the installation of the device. The unique circumstances of each location and the amount of funds available for highway improvements must be considered in determining whether or not to install a traffic control or safety device.

WEAVING. The crossing of traffic streams moving in the same general direction accomplished by merging and diverging.

1-04.3 Definition of Engineer

ENGINEER. The Chief Engineer acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

1-04.4 Specific Conditions

In the Manual sections dealing with the design and application of traffic control devices, the words "shall," "should," and "may" are used to describe specific conditions concerning these devices. To clarify the meanings intended in the Manual by use of these words, the following definitions apply:

1. **SHALL**—A mandatory condition. Where certain requirements in the design or application of the device are described with the "shall" stipulation, it is mandatory when an installation is made that these requirements be met.
2. **SHOULD**—An advisory condition. Where the word "should" is used, it is considered to be advisable usage, recommended but not mandatory.
3. **MAY**—A permissive condition. No requirement for design or application is intended.

Traffic Project Development 1-05**1-05.1 General Procedure**

Policy and procedural instructions for the highway project development functions of Caltrans are contained in the Project Development Procedures Manual prepared by the Office of Planning and Design, Division of Project Development. All traffic safety and operational improvement projects are to be developed in compliance with PDP Manual instructions.

1-05.2 Expenditure Authorizations

Project development personnel and support costs are charged to project expenditure authorizations. Instructions for preparation are in the Expenditure Authorization Guide issued by Financial Affairs.

The EA for each traffic safety and operational improvement is reviewed by the Headquarters Program Advisor for the appropriate program component (HB1, HB4, etc.). Sufficient information must be provided in each expenditure authorization package to verify that the project qualifies for funding under the specified program component.

Approved Expenditure Authorizations must be within the allocations for the program component as included in the approved Activity Plan. Where work is proposed that is not within the approved Activity Plan, there must be a trade-off made to stay within the fiscal year allocations. Proposals which are not included in the approved Activity Plan will not be masterfiled in the EA system until approved by the Highway Program Manager and Financial Affairs.

The FHWA requires that all projects proposed for Federal participation be included in the Annual Federal-Aid Transportation (Section 105) Program and that safety improvement projects be included on the current Statewide Traffic Safety Priority (TSP) List.

1-05.3 Project Reports

Project reports are prepared for all highway development proposals to summarize feasibility studies of the need, alternatives, costs, and overall impacts. For

a general discussion on project reports, see Section 3-4 of the PDP Manual. Project report approval and the appropriate environmental clearance must be obtained prior to requesting funds from the Office of Capital Budgets.

District Directors are authorized to approve project reports for proposed improvements having a construction dollar value of \$750,000 or less and right of way value of \$250,000 or less (both exclusive of local agency participation) with certain exceptions noted in Section 3-4.2 of the PDP Manual.

For project reports requiring Headquarters approval by the Chief, Office of Planning and Design, or the Chief, Office of Traffic Engineering, the District should forward 20 copies to the Chief, OP&D. For District-approved project reports, one copy of the project report (three copies if FHWA approval is required) is to be forwarded to the Chief, OP&D, immediately upon approval by the District Director. The date of the District Director's approval should be noted on the cover page. All project reports (including traffic-related projects) will be routed in similar fashion by OP&D for Headquarters review and evaluation to assure that all applicable requirements have been met.

FHWA approval should be requested on Form FNM-76, "Authority to Proceed." Formal FHWA approval for non-major actions is normally not requested until the PS&E stage. However, if there are known problems or disagreements with the FHWA, a request should be submitted to Headquarters to obtain advance FHWA approval.

Project reports will contain a section entitled "Project Reviews", summarizing all major reviews and coordinations and results. If no review was made by the FHWA, specific reasons must be cited.

In addition to the essential elements of all project reports outlined in Section 3-4.4 of the PDP Manual, traffic safety project reports should include proposed program and funding sources, applicable warrants and current Safety Index calculations.

